

## Dynamic Design: Launch and Propulsion

## Flying Straight

### STUDENT ACTIVITY

#### PROCEDURE

1. What questions occur to you about the fins of a rocket?
2. Think about rocket fins. What effect do you think fins have on a rocket?
3. Have you ever stuck your hand out of the car window at 55 miles per hour? What did you notice?
4. What happened when you moved your hand around?
5. What would happen to a rocket with a nose that moved around like your hand?
6. Look at an arrow. What is there about the structure of the arrow that allows it to fly through the air with such incredible stability? How is an arrow similar to a rocket? Why does it fly straight?
7. Balance an arrow on one of your fingers. Lay the arrow on top of a student's two outstretched index fingers. Have the student slowly bring her or his fingers together. Where is most of the mass of the arrow? Friction will cause the arrow to slide on the lightest side until a balance point is found. The finger is now at the middle of the arrow. The balance point is much closer to the front than the back. You have just discovered where the arrow's transverse center of mass lies.
8. Next, examine why an arrow has feathers toward the back. Using an arrow without feathers, lightly toss it underhanded across an area where you do not hit other students. Do the same with an arrow with its feathers intact. What differences did you see?





9. What happens to the stability when the mass at the end of the arrow is changed? Add mass to one end of the arrow and describe the change in stability.
  
10. What are some of the factors (variables) that are important to rocket fins? Think about what you experienced in the activity in numbers 7-9.
  
11. Choose one fin variable to test (manipulated variable). What variable are you testing (i.e. fin shape, size, number, placement)?
  
12. What response or effect will you be looking for (responding variable)?
  
13. List all the things that have to stay the same to ensure that the test is fair (controlled variable).
  
  
  
  
  
  
  
  
  
  
14. Have your teacher or supervisor approve your plan and schedule a time for testing.

Teacher Signature \_\_\_\_\_

Testing Time \_\_\_\_\_